DRAFT

WPA Feasibility Study
MAD Team
Alternative 2 Documentation

DRAFT

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Updates:

- 30 July 2000 –
  - Modified Hillsboro Impoundment structure (S-M-06) to 4-150 cfs gated culverts to handle 500 cfs NSID flows if impoundment is full and 100 cfs of impoundment boundary seepage
  - Added (S-R-03) earthen plug in C-9 west of US-27 borrow canal for C-9 Impoundment
  - Changed (S-R-04) from a 1000 cfs discharge structure to 150 cfs gated culverts discharging from the C-9 eastern impoundment into the C-9 Canal
  - Changed pump station (P-S-02) from CLBSA ON/OFF elevations to: ON above –27.0 ft-NGVD with delivery demand, OFF below –27.0 ft-NGVD or no delivery demand
- 15 July 2000 – modified C-11 profile of impoundment levee and seepage canal on eastern boundary to reflect lower adjacent levee - levee toe to levee centerline changed from 36’ to 21’ – total from east ROW to centerline of levee changed from 150’ to 135’
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Component: Acme Basin B Discharge
Component: OPE List: A

Alternative 2 Modifications to Alternative 1:

a) Remove STA from system.
b) During peak runoff events:

- 125 cfs is routed from Basin B to Basin A. Basin A runoff to C-51 is increased by 125 cfs (1/3″ per day of Basin A) which routed to STA-1E.
- Pump into the impoundment at a rate of 375 cfs until event is over (canal levels recede) or impoundment is full.

c) During off-peak the impoundment will be drawn down at a rate of 125 cfs. Discharge will be routed through Basin B to Basin A to C-51 and will either go to:

- STA-1E for treatment or
- to LWDD to maintain canal levels or delivery to Ag Reserve Impoundment or
- sent to tide because the previous two opportunities to keep the water in the regional system are not available.

d) Include the seepage canal on southern side of the impoundment.

Design Rational:

a) The STA may not be required to handle 125 cfs runoff that could be routed to existing or future regional system components (STA-1E or Ag Reserve Impoundment) without causing adverse flood impacts within Basin B.

Operational Scenarios & Rules:

Described in Alternative 2 Modifications to Alternative 1 section

Alternative Summary & Component Description/Modifications:

- Storage calculations:
  Impoundment Area: 533 acres
  Maximum Depth: 8 feet
  Maximum Storage: 4265 acft

  Fill rate at 375 cfs: 1.40 ft/day
  Time to Fill 8′ at 375 cfs: 5.7 days

  Drawdown rate at 125 cfs: 0.47 ft/day
  Time to Drawdown 8′ at 125 cfs: 17.2 days

Structures:

1) (P-OPE-02) 65 cfs impoundment seepage pump, ON 13.6 ft-NGVD, OFF 13.0 ft-NGVD
2) (P-OPE-03) 65 cfs impoundment seepage pump, ON 13.6 ft-NGVD, OFF 13.0 ft-NGVD
3) (P-OPE-04) 375 cfs pump into impoundment, ON 14.0 ft-NGVD, OFF when impoundment is full or when stage in canal Acme C-25 is 13.0 ft-NGVD
4) (S-OPE-01) 125 cfs gated culvert to discharge out of impoundment to C-6 or C-25, OPEN when required to drawdown impoundment, CLOSED when impoundment reached 1.0’ in depth or inflow pump P-OPE-04 is ON

Levees:

1) (L-OPE-01) Impoundment levee on all boundaries, top width 12’, side slopes 1V on 3H, height 14’ = 8’ depth + 6’ superiority, average ground 16.2 ft-NGVD, bottom width 96’, length 19550’, width (east to west) 4875’, length (north to south) 4900’

Canals:

1) (C-OPE-02) impoundment seepage canal on western, northern, and eastern boundary, bottom width 12’, side slopes 1V on 3H, bottom elevation 9.2 ft-NGVD, average ground 16.2 ft-NGVD, top width 54’, length 15325’

Policy Issues, Seepage Issues and/or Questions:

a) In order for this alternative to work the impoundment must be drawn down to allow storage for subsequent storm events. Prior to and possibly once the Ag Reserve Impoundment coming on-line it may be necessary to send some or all of this discharge to tide. If it is determined that 125 cfs can be routed to STA-1E during off peak than discharging to tide could be eliminated prior to Ag Reserve Impoundment coming on-line. Additional operational flexibility will be provided once the Ag Reserve Impoundment is on-line.
b) Are separate seepage pumps and canals required since they operate at similar canal levels as the impoundment inflow pump and canal? This will allow the existing canals (conveyance may need improvement) to perform the seepage function thus reducing the levee setback and increasing impoundment area and storage. In addition the three pump locations can be combined into one location with staged pumps.

Component: Strazzula
Component: OPE List: A

Alternative 2 Modifications to Alternative 1:
a) Control structure S-STZ-01 is operated differently than modeled in Alternative 1.

Operational Scenarios & Rules: None
a) Control structure S-STZ-01 is closed and G-94C when L-40 is above 15.8 ft-NGVD, open when L-40 is less than 15.8 and G-94C is closed.

Alternative Summary & Component Description/Modifications:

- Storage calculations:
  Wetland Area: 3470 acres

Structures:
1) (S-STZ-01) 300 cfs gated culverts at eastern boundary of wetlands and on the LWDD L23W canal

Levees:
1) (L-SOPE-01) Eastern boundary berm, top width 2’, side slopes 1V on 3H, height 3’, average ground 17.0 ft-NGVD, bottom width 20’, length 54470’

Canals: None

Policy Issues, Seepage Issues and/or Questions:
No new issues

Component: Ag Reserve Impoundment/ASR
Component: VV List: B

Alternative 2 Modifications to Alternative 1:
a) Reconfigure footprint to the west of the power lines.
b) Create an impoundment compartment to the north and south of LWDD L-30.
c) Use horizontal drains for ASR component.

Design Rational:
a) Footprint has less perimeter and out of right of way of power lines.

Operational Scenarios & Rules:
a) Pump maximum of 600 cfs into northern compartment and 250 cfs into southern compartment.

Alternative Summary & Component Description/Modifications:

- Storage calculations:

  North Impoundment Area: 174 acres
  Maximum Depth: 12 feet
  Maximum Storage: 2088 acft

  South Impoundment Area: 750 acres
  Maximum Depth: 12 feet
  Maximum Storage: 9000 acft

  Total Impoundment Area: 924 acres
  Maximum Depth: 12 feet
  Maximum Storage: 11088 acft
  Fill rate at 850 cfs: 1.82 ft/day
  Time to Fill 12’ at 850 cfs: 6.6 days

  Drawdown rate at 500 cfs: 1.07 ft/day
  Time to Drawdown 12’ at 500 cfs: 11.2 days

Structures:
1) (P-VV-01) 400 cfs pump north of meander canal, ON 16.2 ft-NGVD, OFF 15.5 ft-NGVD
2) (P-VV-03) 250 cfs pump into southern impoundment from southeastern end, ON 16.2 ft-NGVD, OFF 15.5 ft-NGVD
3) (P-VV-04) 200 cfs seepage pumps, ON 12.7 ft-NGVD, OFF 12.5 ft-NGVD
4) (P-VV-05) 600 cfs pump into northern impoundment, ON 16.2 ft-NGVD, OFF 15.5 ft-NGVD

5) (S-VV-01) 500 cfs gated culverts discharging from impoundment to LWDD canals
6) (S-VV-02) 300 cfs culverts with riser discharging from impoundment to L-40 Borrow Canal
7) (S-VV-03) 300 cfs gated box culvert allows flow from northern impoundment compartment to southern compartment
8) (S-VV-04) 300 cfs gated box culvert allows flow from northern impoundment compartment to southern compartment

Levees:

1) (L-VV-01) Southern impoundment levee on all boundaries that tie into L-40, top width 12’, side slopes 1V on 3H, height 15’ = 12’ depth + 3.0’ superiority, average ground 16.0 ft-NGVD, bottom width 102’, length 19581’
2) (L-VV-02) New levee berm west of SR-7 the length of the northern buffer, top width 2’, side slopes 1V on 3H, height 3’, average ground 16.0 ft-NGVD, bottom width 20’, length 18500’
3) (L-VV-03) Northern impoundment levee on east and north boundaries that tie into L-40 and the southern impoundment, top width 12’, side slopes 1V on 3H, height 15’ = 12’ depth + 3.0’ superiority, average ground 16.0 ft-NGVD, bottom width 102’, length 5902’

Canals:

1) (C-VV-01) Impoundment seepage canals on eastern and southern boundary, bottom width 25’, side slopes 1V on 4H, bottom elevation 8.0 ft-NGVD, average ground 16 ft-NGVD, top width 89’, length 12677’
2) (C-VV-02) 600 cfs meandering canal for conveyance to impoundment with littoral zones for F&W habitat, bottom width 46’, side slopes 1V on 3H, bottom elevation 7.0 ft-NGVD, average ground 16’, top width 100’, length 19054’
3) (C-VV-03) Impoundment seepage and conveyance canal on northern boundary, bottom width 47’, side slopes 1V on 2H, bottom elevation 4.1 ft-NGVD, average ground 16 ft-NGVD, top width 95’, length 4037’
4) (C-VV-04) Impoundment seepage canals on northern and eastern boundary of northern impoundment, bottom width 25’, side slopes 1V on 4H, bottom elevation 8.0 ft-NGVD, average ground 16 ft-NGVD, top width 89’, length 6137’
5) (C-VV-05) 250 cfs conveyance canal to southern impoundment, bottom width 25’, side slopes 1V on 3H, bottom elevation 8.0 ft-NGVD, average ground 16’, top width 73’, length 1521’

Policy Issues, Seepage Issues and/or Questions:

Component: Hillsboro Impoundment/ASR
Component: M List: A (ASR is B list)

Alternative 2 Modifications to Alternative 1:
a) Raise LWDD E-1W-S canal level from 8 ft-NGVD to 12 ft-NGVD to reduce seepage from length of approximately 9300' of L-40.
b) Backpump peak maximum 500 cfs runoff from North Springs Improvement District (NSID) into southern impoundment compartment.

Design Rational:
a) Investigate seepage reduction from L-40 by raising LWDD E-1W-S.
b) Capture NSID in impoundment which is currently permitted to be discharged into L-36.

Operational Scenarios & Rules:
a) Pump from Hillsboro into northwest impoundment H1.
b) Allow gravity flow to the other two compartments (H2 and H3) when elevation 14 ft-NGVD is reached in H1.
c) Backpump LWDD E-1W-S when canal gets above 12.1 ft-NGVD.

Alternative Summary & Component Description/Modifications:

Impoundments Areas:

- Storage calculations:

Impoundment	Area (acres)	Depth (ft)	Storage (acft)
H1-northwestern	840	6	5040
H2-northeastern	825	6	4950
H3-southern	585	6	3510
Total	2250	6	13500

Northern Impoundments:
Total Impoundment Area: 1665 acres
Fill/Drawdown rate at 700 cfs: 0.83 ft/day
Time to Fill/Drawdown 6' at 700 cfs: 7.2 days

Fill rate at 1200 cfs: 1.43 ft/day
Time to Fill 6' at 1200 cfs: 4.2 days

Southern Impoundment:
Total Impoundment Area: 585 acres
Fill rate at 500 cfs: 1.70 ft/day
Time to Fill 6’ at 500 cfs: 3.5 days

Drawdown rate at 100 cfs: 0.34 ft/day
Time to Drawdown 6’ at 100 cfs: 17.7 days

Structures:
1) (P-M-02) 700 cfs inflow pump into impoundment H1, ON 7.8 ft-NGVD, OFF 7.6 ft-NGVD
2) (P-M-04) 500 cfs inflow pump on southern impoundment off of L-36, ON 7.3 ft-NGVD, OFF 7.0 ft-NGVD
3) (P-M-05) 500 cfs inflow pump on northeastern impoundment off of LWDD E-1W-S, ON 12.1 ft-NGVD, OFF 9.5 ft-NGVD
4) (S-M-01) 700 cfs gated culverts to discharge from impoundment H1 to Hillsboro Canal, 4 - 72” diameter, invert 7 ft-NGVD, length 70’
5) (S-M-03) 100 cfs gated culvert discharge from impoundment H1 to H2 impoundment, diameter 72”, invert 9.0 ft-NGVD, length 60’, weir invert 11.0 ft-NGVD (ground elevation)
6) (S-M-04) 3-100 cfs ungated culverts discharge from impoundment H1 to H2 impoundment, diameter 72”, invert 9.0 ft-NGVD, length 60’, weir invert 15.0 ft-NGVD
7) (S-M-05) 3-100 cfs gated culverts discharge from impoundment H1 to H3 impoundment, diameter 72”, invert 9.0 ft-NGVD, length 200’
8) (S-M-06) 4-150 cfs gated culverts to handle 500 cfs NSID flows if impoundment is full and 100 cfs of impoundment boundary seepage, diameter 72”, invert 1.0 ft-NGVD, length 60’
9) (S-M-07) 100 cfs gated culvert discharge from impoundment H3 to Hillsboro Canal, diameter 72”, invert 7.0 ft-NGVD, length 150’
10) (S-M-08) 4-150 cfs gated culverts to hold LWDD E-1W-S canal reach level up at 12 ft-NGVD, diameter 72”, invert 1.0 ft-NGVD, length 60’
11) (S-M-09) 2-150 cfs gated culverts to discharge from southeastern impoundment to LWDD E-1W-S, diameter 72”, invert 7.0 ft-NGVD, length 100’
12) (S-M-10) 4-150 cfs gated culverts for eastern boundary seepage canal and capable of passing 600 cfs if LWDD E-1W-S canal needs to be drawn down, diameter 72”, invert 0.0 ft-NGVD, length 60’

Levees:

1) (L-M-01) Impoundment levee on eastern boundary north of Hillsboro Canal, top width 12′, side slopes 1V on 3.5H, height 12′ = 6′ depth + 6′ superiority, average ground 11.5 ft-NGVD, bottom width 96′, length 8000′
2) (L-M-02) Impoundment H3 levee on western boundary along existing levee L-36, top width 12′, side slopes 1V on 3.5H, height 12′ = 6′ depth + 6′ superiority, average ground 10.0 ft-NGVD, bottom width 96′, length 4900′
3) (L-M-03) Impoundment H3 levee on southern and eastern boundary, top width 12′, side slopes 1V on 3.5H, height 12′ = 6′ depth + 6′ superiority, average ground 11.0 ft-NGVD, bottom width 96′, length 9800′
4) (L-M-04) Internal levee separating impoundment H1 and H2, top width 12′, side slopes 1V on 3H, height 6.5′ = 6′ depth + 0.5′ superiority, average ground 11.5 ft-NGVD, bottom width 51′, length 6200′
5) (L-M-05) Impoundment levee on southern boundary of impoundment H1 and H2 north of Hillsboro Canal, top width 12′, side slopes 1V on 3H, height 9′ = 6′ depth + 3′ superiority, average ground 11.0 ft-NGVD, bottom width 66′, length 15750′
6) (L-M-06) Impoundment levee on northern boundary of impoundment H3 south of Hillsboro Canal and Lox Road, top width 12′, side slopes 1V on 3H, height 9′ = 6′ depth + 3′ superiority, average ground 11.0 ft-NGVD, bottom width 66′, length 7620′

Canals:

1) (C-M-02) Impoundment H2 seepage canal with littoral zones for F&W habitat on eastern boundary north of Hillsboro Canal, bottom width 5′, side slopes 1V on 2H, bottom elevation -5.0 ft-NGVD, average ground 11.5 ft-NGVD, top width 71′, length 7670′, 29′ ROW for littoral zone
2) (C-M-03) Pump getaway canal in impoundment H2, bottom width 40′, side slopes 1V on 3H, bottom elevation 1.0 ft-NGVD, average ground 11.0 ft-NGVD, top width 100′, length 2500′
3) (C-M-04) Impoundment H3 seepage canal with littoral zones for F&W habitat on southern and eastern boundary south of Hillsboro Canal, bottom width 26′, side slopes 1V on 2H, bottom elevation -5.0 ft-NGVD, average ground 11.0 ft-NGVD, top width 90′, length 9750′, 30′ ROW for littoral zone

Alternative Features not Required by Modelers:

1) Profile of impoundment levee H2 and seepage canal on eastern boundary north of Hillsboro Canal
   250′ from east ROW to centerline of levee =
   12′ east ROW +
   29′ littoral zone for F&W habitat +
   71′ top width of seepage canal (bottom –5 NGVD) +
   90′ ASR, geotechnical toe bench and other (Red Bay tree transplant) +
   48′ from levee toe to levee centerline
2) Profile of impoundment levee and seepage canal on southern and eastern boundary of H3
   195′ from east ROW to centerline of levee =
   12′ south and east ROW +
   30′ littoral zone for F&W habitat +
   90′ top width of seepage canal (bottom –5 NGVD) +
   15′ geotechnical toe bench and maintenance ROW
   48′ from levee toe to levee centerline

Policy Issues, Seepage Issues and/or Questions:

a) How much seepage is reduced by raising LWDD E-1W-S canal level from 8 ft-NGVD to 12 ft-NGVD for the approximately 9300′ of L-40. Does raising the canal elevation reduce flood protection of existing areas? Is this cost effective?

Component: C-11 Impoundment
Component: Q List: A

Alternative 2 Modifications to Alternative 1:

a) Two compartments are created inside the impoundment footprint. The compartment to the west will store water to a maximum depth of 6′. The compartment to the east will have a maximum depth of 2′.

Design Rational:

a) Improve seepage control and create a maximum 2′ compartment for mitigated wetlands.

Operational Scenarios & Rules:

a) Allow storage of a maximum 2′ of water in the eastern compartment.

Alternative Summary & Component Description/Modifications:

- Storage calculations:

Impoundment	Area (acres)	Depth (ft)	Storage (acft)
Western	1119	6	6714
Eastern	615	2	1230
Total	1734		7944

Western Impoundment:
Total Impoundment Area: 1119 acres
Fill rate at 2500 cfs: 4.43 ft/day
Time to Fill 6′ at 2500 cfs: 1.4 days

Drawdown rate at 2200 cfs: 3.90 ft/day
Time to Drawdown 6′ at 2200 cfs: 1.5 days

Eastern Impoundment:
Total Impoundment Area: 615 acres
Fill rate at 150 cfs: 0.48 ft/day
Time to Fill 2′ at 150 cfs: 4.1 days

Structures:

1) (P-Q-01) 60 cfs pump for flood protection of mobile home park to backpump into US-27 conveyance canal, ON 6.0 ft-NGVD, OFF 5.0 ft-NGVD
2) (P-Q-02) 25 cfs seepage collection pump station for the northern boundary of the impoundment, ON 5.0 ft-NGVD, OFF 4.7 ft-NGVD
3) (P-Q-03) 240 cfs seepage collection pump for the eastern boundary of the impoundment, ON 5.3 ft-NGVD, OFF 5.0 ft-NGVD
4) (P-Q-04) 2500 cfs inflow pump station for the C-11 impoundment, ON 4.0 ft-NGVD, OFF 3.0 ft-NGVD
5) (P-Q-05) 60 cfs pump for flood protection of FPL substation to backpump into US-27 conveyance canal, ON 6.3 ft-NGVD, OFF 5.8 ft-NGVD
6) (P-Q-06) 80 cfs seepage collection pump for western boundary of the impoundment, ON 8.0 ft-NGVD, OFF 7.5 ft-NGVD
7) (S-Q-01) 2200 cfs gated spillway discharges from impoundment into the US-27 conveyance canal
8) (S-Q-03) 2500 cfs gated culverts discharges from US-27 conveyance canal to C-11 for water supply
9) (S-Q-04) 500 cfs gated culverts discharge from WCA-3A into L-33 conveyance canal to CLBSA
10) (S-Q-06) 240 cfs gated culverts discharges from eastern seepage canal to C-11, 3-72″ diameter, invert – 2.5 ft-NGVD, length 60′
11) (S-Q-07, S-Q-08, and S-Q-09) 50 cfs gated culverts discharges from western impoundment to eastern impoundment, 2-72″ diameter, invert 0.0 ft-NGVD, length 60′

Levees:

1) (L-Q-01) Impoundment levee around perimeter

- Length adjacent to 6′ impoundment, top width 12′, side slopes 1V on 3H, height 11′ = 6′ depth + 5′ superiority, average ground 6.0 ft-NGVD, bottom width 78′, length 15850′
- Length adjacent to 2′ impoundment, top width 12′, side slopes 1V on 3H, height 5′ = 2′ depth + 3′ superiority, average ground 6.0 ft-NGVD, bottom width 42′, length 22784′

2) (L-Q-04) Internal levee to between 6′ and 2′ impoundments, top width 12′, side slopes 1V on 3H, height 7′ = 6′ depth + 1′ superiority, average ground 6.0 ft-NGVD, bottom width 54′, length 18500′

Canals:

1) (C-Q-01) Impoundment seepage canal with littoral zones for F&W habitat on eastern boundary, bottom width 20’, side slopes 1V on 2H, bottom elevation –2.5 ft-NGVD, average ground 6.0 ft-NGVD, top width 54’, length 15000’, 30’ ROW for littoral zone
2) (C-Q-04) Impoundment seepage canal on western boundary, bottom width 10’, side slopes 1V on 2H, bottom elevation 0.0 ft-NGVD, average ground 6.0 ft-NGVD, top width 34’, length 12845’
3) (C-Q-05) Impoundment seepage canal on northern boundary, bottom width 10’, side slopes 1V on 2H, bottom elevation 0.0 ft-NGVD, average ground 6.0 ft-NGVD, top width 34’, length 6670’

Alternative Features not Required by Modelers:

1) Profile of impoundment levee and seepage canal on eastern boundary
   135’ from east ROW to centerline of levee =
   12’ east ROW +
   30’ littoral zone for F&W habitat +
   54’ top width of seepage canal (bottom –2.5 NGVD) +
   18’ geotechnical toe bench and maintenance ROW +
   21’ from levee toe to levee centerline

Policy Issues, Seepage Issues and/or Questions:

Component: C-9 Impoundment
Component: R List: A

Alternative 2 Modifications to Alternative 1:

a) Two compartments are created inside the impoundment footprint. The compartment to the west will store water to a maximum depth of 6′. The compartment to the east will have a maximum depth of 2′.
b) Area north of impoundment is added and will have a maximum depth of 2′.

Design Rational:

a) Improve seepage control and create a maximum 2′ compartment for mitigated wetlands.

Operational Scenarios & Rules:

a) Allow storage of a maximum 2′ of water in the eastern compartment.

Alternative Summary & Component Description/Modifications:

- Storage calculations:

Impoundment	Area (acres)	Depth (ft)	Storage (acft)
Western	1232	6	7392
Eastern	474	2	948
Northern	385	2	770
Total	2091		9110

Western Impoundment:
Total Impoundment Area: 1232 acres
Fill/Drawdown rate at 1000 cfs: 1.61 ft/day
Time to Fill/Drawdown 6′ at 1000 cfs: 3.7 days

Eastern Impoundment:
Total Impoundment Area: 474 acres
Fill rate at 150 cfs: 0.63 ft/day
Time to Fill 2′ at 150 cfs: 3.2 days

Northern Impoundment:
Total Impoundment Area: 385 acres
Fill rate at 50 cfs: 0.26 ft/day
Time to Fill 2′ at 50 cfs: 7.8 days

Structures:

1) (P-XX-01) 1000 cfs pump station into C-9 impoundment from NLBSA, ON when –10.0 ft-NGVD with delivery demand, OFF –10.0 ft-NGVD
2) (P-R-01) 100 cfs seepage collection pump station for the western boundary, ON 8.0 ft-NGVD, OFF 7.5 ft-NGVD
3) (P-R-02) 100 cfs seepage collection pump station for the eastern boundary, ON 3.0 ft-NGVD, OFF 2.5 ft-NGVD
4) (P-R-03) 100 cfs seepage collection pump station for the northern boundary, ON 3.0 ft-NGVD, OFF 2.5 ft-NGVD
5) (P-R-04) 1000 cfs pump station into C-9 impoundment from US-27 conveyance canal, ON when C-11 impoundment is making deliveries, OFF when impoundment is full
6) (S-R-01) 1000 cfs gated spillway discharging from the C-9 western impoundment into the C-9 Canal
7) (S-R-02) 2500 cfs gated spillway discharging from the US-27 borrow canal into the C-9 Canal
8) (S-R-04) 150 cfs gated culverts discharging from the C-9 eastern impoundment into the C-9 Canal, 3-72″ diameter, invert 0.0 ft-NGVD, length 45′
9) (S-R-05, S-R-06, and S-R-07) 50 cfs gated culverts discharges from western impoundment to eastern impoundment, 2-72″ diameter, invert –2.5 ft-NGVD, length 65′
10) (S-R-08) 50 cfs gated culverts discharges from western impoundment to northern impoundment, 2-72″ diameter, invert –2.5 ft-NGVD, length 65′

Levees:

1) (L-R-01) Impoundment levee around perimeter

- Length adjacent to 6′ impoundment, top width 12′, side slopes 1V on 3H, height 11′ = 6′ depth + 5′ superiority, average ground 5.0 ft-NGVD, bottom width 78′, length 20975′
- Length adjacent to 2′ impoundment, top width 12′, side slopes 1V on 3H, height 5′ = 2′ depth + 3′ superiority, average ground 5.0 ft-NGVD, bottom width 42′, length 14320′

2) (L-R-03) Internal levee in western impoundment, top width 12′, side slopes 1V on 3H, height 7′ = 6′ depth + 1′ superiority, average ground 5.0 ft-NGVD, bottom width 54′, length 7350′
3) (L-R-04) Internal levee in separating western and eastern impoundments, top width 12′, side slopes 1V on 3H, height 7′ = 6′ depth + 1′ superiority, average ground 5.0 ft-NGVD, bottom width 54′, length 10340′

4) (L-R-05) Impoundment levee around perimeter of northern 2′ impoundment, top width 12′, side slopes 1V on 3H, height 5′ = 2′ depth + 3′ superiority, average ground 5.0 ft-NGVD, bottom width 42′, length 17790′

Canals:

1) (C-R-01) Impoundment seepage canal with littoral zones for F&W habitat on eastern and northern boundary up to northern impoundment, bottom width 20′, side slopes 1V on 2H, bottom elevation –4.5 ft-NGVD, average ground 5.0 ft-NGVD, top width 58′, length 15835′, 30′ ROW for littoral zone
2) (C-R-01) Impoundment seepage canal around 2′ deep northern impoundment, bottom width 10′, side slopes 1V on 2H, bottom elevation –4.5 ft-NGVD, average ground 5.0 ft-NGVD, top width 48′, length 17747′
3) (C-R-02) Impoundment seepage canal on western boundary, bottom width 10′, side slopes 1V on 2H, bottom elevation 0.0 ft-NGVD, average ground 5.5 ft-NGVD, top width 32′, length 10420′

Alternative Features not Required by Modelers:

1) Profile of impoundment levee and seepage canal on eastern and northern boundary up to northern impoundment
   140′ from east ROW to centerline of levee =
   12′ east ROW +
   30′ littoral zone for F&W habitat +
   58′ top width of seepage canal (bottom –2.5 NGVD) +
   13′ geotechnical toe bench and maintenance ROW +
   27′ from levee toe to levee centerline

Policy Issues, Seepage Issues and/or Questions:

Component: North Lake Belt Storage Area (NLSBA)
Component: XX List: B

Alternative 2 Modifications to Alternative 1:
a) Reduce size of eastern Water Redistribution Area (WRA) and set back 500 feet from C-9.
b) Add a western WRA and set back 500 feet from C-9.
c) Deliver up to 4’ of water into WRA until full. Once WRA is full remaining available water is discharged into NLBSA impoundment.

Design Rational:
a) 500’ setback should reduce seepage into C-9.
b) Land that the airport is located can be used.
c) Create above ground impoundments during the wet season.

Operational Scenarios & Rules:
a) Pump to WRA until full and then to NLBSA.

Storage Comparison:

	Area (acres)	Storage Elev. (ft-NGVD)		Range (ft)	Storage (acft)
		Minimum	Maximum		
D13R	4500	-15.0	5.0	20.0	90,000
Alt1/2	2910	-26.0	5.0	31.0	90,210

Alternative Summary & Component Description/Modifications:

- Area calculations:
  Impoundment Area: 2910 acres
  East WRA: 680 acres
  West WRA: 364 acres
  Southwest WRA: 214 acres

- Seepage curtain calculations:
  D13R Perimeter: 77270 feet
  Alternative 1/2 Perimeter: 46550 feet
  Perimeter Reduction: 30720 feet/5.82 miles/39.76%

- WRA calculations:

  East WRA
  Total Impoundment Area: 680 acres
  Fill rate at 600 cfs: 1.75 ft/day
  Time to Fill 4’ at 600 cfs: 2.3 days

  West WRA
  Total Impoundment Area: 364 acres
  Fill rate at 200 cfs: 1.09 ft/day
  Time to Fill 4’ at 200 cfs: 3.7 days

  Southwest WRA
  Total Impoundment Area: 214 acres
  Fill rate at 100 cfs: 0.93 ft/day
  Time to Fill 4’ at 100 cfs: 4.3 days

Structures:

1) (P-XX-01) 1000 cfs pump station from NLBSA into C-9 impoundment, ON above –10.0 ft-NGVD with delivery demand, OFF –10.0 ft-NGVD
2) (P-XX-02) 600 cfs inflow pump station from C-9 into NLBSA or East WRA, ON 3.0 ft-NGVD, OFF 2.5 ft-NGVD
3) (P-XX-03) 100 cfs pump station from NLBSA into East WRA, ON above –10.0 ft-NGVD with delivery demand, OFF –15.0 ft-NGVD
4) (P-XX-04) 300 cfs inflow pump station from C-6 into NLBSA, ON 3.5 ft-NGVD, OFF 3.0 ft-NGVD
5) (P-XX-08) 180 cfs seepage collection pump station for the southwestern WRA, ON 3.5 ft-NGVD, OFF 3.0 ft-NGVD
6) (P-XX-09) 100 cfs pump station from NLBSA into southwestern WRA, ON above –10.0 ft-NGVD with delivery demand, OFF –10.0 ft-NGVD
7) (P-XX-10) 180 cfs seepage collection pump station for the southwestern WRA, ON 3.5 ft-NGVD, OFF 3.0 ft-NGVD
8) (P-XX-11) 200 cfs pump station from NLBSA into West WRA, ON above –10.0 ft-NGVD with delivery demand, OFF –10.0 ft-NGVD
9) (P-XX-12) 200 cfs pump station from C-9 into West WRA, ON above 3.0 ft-NGVD, OFF 2.5 ft-NGVD
10) (P-XX-13) 180 cfs seepage collection pump station for the West WRA, ON 3.5 ft-NGVD, OFF 3.0 ft-NGVD
11) (S-XX-01) 2000 cfs gated spillway and bridge to pass flows under Krome Avenue
12) (S-XX-03) 2500 cfs gated spillway for deliveries of US-27 conveyance to NLBSA

13) (S-XX-04) 500 cfs gated culverts on C-9 east of C-9 impoundment
14) (S-XX-05) 100 cfs gated culverts for East WRA discharge to C-9
15) (S-XX-06) 300 cfs culverts for C-6 delivery to NLBSA
16) (S-XX-07) 100 cfs gated culverts for Southwest WRA discharge to C-6
17) (S-XX-09) 300 cfs gated culverts for Snapper Creek East delivery to C-2/C-4
18) (S-XX-10) 600 cfs gated culverts on C-6 east of Turnpike
19) (S-XX-11) 300 cfs gated culverts for C-6 delivery to Turnpike canal
20) (S-XX-12) 100 cfs gated culverts for West WRA delivery to C-9
21) (S-XX-13) 100 cfs gated culverts for East WRA seepage canal delivery to canal C-XX-07
22) (S-XX-14) 300 cfs gated culverts for East WRA delivery to C-6 via canal C-XX-07

Levees:

1) (L-XX-01) NLBSA perimeter levee between West WRA and Southwest WRA, top width 8′, side slopes 1V on 3H, height 3′ = ground elevation + 3′ superiority, average ground 5.0 ft-NGVD, bottom width 26′, length 4288′
2) (L-XX-02) NLBSA perimeter levee on northern boundary, top width 8′, side slopes 1V on 3H, height 3′ = ground elevation + 3′ superiority, average ground 5.0 ft-NGVD, bottom width 26′, perimeter length 14537′
3) (L-XX-03) Southwest WRA perimeter levee on all boundaries, top width 12′, side slopes 1V on 3H, height 7′ = 4′ depth + 3′ superiority, average ground 5.0 ft-NGVD, bottom width 54′, perimeter length 19509′
4) (L-XX-05) East WRA perimeter levee on all boundaries, top width 12′, side slopes 1V on 3H, height 7′ = 4′ depth + 3′ superiority, average ground 5.0 ft-NGVD, bottom width 54′, perimeter length 22102′
5) (L-XX-07) NLBSA perimeter levee on southern boundary from Southwest WRA to canal CXX-07, top width 8′, side slopes 1V on 3H, height 3′ = ground elevation + 3′ superiority, average ground 5.0 ft-NGVD, bottom width 26′, length 9795′
6) (L-XX-08) NLBSA perimeter levee on eastern boundary from East WRA to levee section L-XX-07, top width 12′, side slopes 1V on 3H, height 7′ = ground elevation + 7′ superiority, average ground 5.0 ft-NGVD, bottom width 54′, length 5577′

7) (L-XX-09) West WRA perimeter levee on all boundaries, top width 12’, side slopes 1V on 3H, height 7’ = 4’ depth + 3’ superiority, average ground 5.0 ft-NGVD, bottom width 54’, perimeter length 18610’

Canals:

1) (C-XX-01) Southwest WRA seepage canal around perimeter boundaries, bottom width 30’, side slopes 1V on 3H, bottom elevation -4.0 ft-NGVD, average ground 5.0 ft-NGVD, top width 84’, length 16244’
2) (C-XX-04) Conveyance canal from C-6 to Snapper Creek, bottom width 40’, side slopes 1V on 2H, bottom elevation -4.5 ft-NGVD, average ground 5.0 ft-NGVD, top width 78’, length 7605’
3) (C-XX-05) Conveyance canal from Snapper Creek/C-6 to Snapper Creek South, bottom width 20’, side slopes 1V on 2H, bottom elevation -4.5 ft-NGVD, average ground 5.0 ft-NGVD, top width 58’, length 19054’
4) (C-XX-07) New canal from East WRA to C-6 canal, bottom width 80’, side slopes 1V on 2H, bottom elevation -4.0 ft-NGVD, average ground 5.0 ft-NGVD, top width 116’, length 17494’
5) (C-XX-08) West WRA seepage canal around perimeter boundaries, bottom width 30’, side slopes 1V on 3H, bottom elevation -4.0 ft-NGVD, average ground 5.0 ft-NGVD, top width 84’, length 10220’
6) (C-XX-09) East WRA seepage canal on southern boundary, bottom width 30’, side slopes 1V on 3H, bottom elevation -4.0 ft-NGVD, average ground 5.0 ft-NGVD, top width 84’, length 4699’

Policy Issues, Seepage Issues and/or Questions:

Component: Central Lake Belt Storage Area (CLBSA)
Component: S List: B

Alternative 2 Modifications to Alternative 1:
a) Reduce the size of the Water Redistribution Area (WRA) to 468 acre and connect it to CLBSA

Design Rational:
a) WRA area footprint avoids permitted lands designated for rock mining.

Operational Scenarios & Rules:
No operational change from Alternative 1.

Storage Comparison:

	Area (acres)	Storage Elev.(ft-NGVD)		Range (ft)	Storage (acft)
		Minimum	Maximum		
D13R	5200	-15.0	21.0	36.0	187,200
Alt1/2	3960	-27.0	21.0	48.0	187,380

Alternative Summary & Component Description/Modifications:

- Area calculations:
  Impoundment Area: 3960 acres
  WRA Area: 468 acres

- Seepage curtain calculations:
  D13R Perimeter: 70470 feet
  Alternative 1/2 Perimeter: 57645 feet
  Perimeter Reduction: 12825 feet/2.43 miles/18.20%

- WRA calculations:
  Total Impoundment Area: 468 acres
  Fill rate at 800 cfs: 3.39 ft/day
  Time to Fill 4’ at 800 cfs: 1.2 days

Structures:
1) (P-S-01) 1500 cfs inflow pump station to CLBSA impoundment, ON 4.0 ft-NGVD or above in supply canal, OFF 3.5 ft-NGVD or when impoundment reaches 21.0 ft-NGVD
2) (P-S-02) 800 cfs pump station from CLBSA into CLBSA STA, ON above –27.0 ft-NGVD with delivery demand, OFF below –27.0 ft-NGVD or no delivery demand

3) (S-S-01) 1500 cfs gated spillway discharging from L-33 to C-6
4) (S-S-02) 300 cfs gated culverts discharging from Pennsuco Canal to Snapper Creek Protection Canal
5) (S-S-03) 800 cfs gated culverts discharging from CLBSA WRA to L-30
6) (S-S-06) 300 cfs gated culverts discharging down Turnpike Canal C-XX-05
7) (S-BB-01) 3-200 cfs gated culverts for C-6 canal divide structure, diameter 72”, invert –3.5 ft-NGVD, length 20’
8) (S-BB-02) 1400 cfs gated spillway discharging from C-6 to Dade-Broward Canal
9) (S-BB-03) 800 cfs culverts for deliveries from Dade-Broward levee canal to L-30 canal or reverse
10) (S-BB-04) 1400 cfs gated spillway on Dade-Broward levee canal
11) (S-BB-05) 300 cfs gated culverts discharging from canal C-EEE-02 to Dade-Broward Wellfield protection canal

Levees:

1) (L-S-01) CLBSA perimeter levee on all boundaries, top width 12’, side slopes 1V on 3H, height 19’ = 16’ depth + 3’ superiority, average ground 5.0 ft-NGVD, bottom width 126’, perimeter length 58185’
2) (L-S-02) CLBSA WRA perimeter levee on eastern boundary, top width 12’, side slopes 1V on 3H, height 5’ = 4’ depth + 1’ superiority, average ground 5.0 ft-NGVD, bottom width 42’, length 14052’
3) (L-S-03) CLBSA WRA perimeter levee on western and southern boundary, top width 12’, side slopes 1V on 3H, height 5’ = 4’ depth + 1’ superiority, average ground 5.0 ft-NGVD, bottom width 42’, length 14596’
4) (L-BB-01) Dade-Broward Levee west of canal, top width 10’, side slopes 1V on 3H, height 5’, average ground 5.0 ft-NGVD, bottom width 40’, length 47325’
5) (L-BB-02) CLBSA WRA perimeter levee on northern boundary, top width 10’, side slopes 1V on 3H, height 5’ = 4’ depth + 1’ superiority, average ground 5.0 ft-NGVD, bottom width 40’, length 3185’

Canals:

1) (C-S-01) Rerouted Snapper Creek Canal to southern boundary of CLBSA, bottom width 12’, side slopes 1V on 1H, bottom elevation -0.0 ft-NGVD, average ground 5.0 ft-NGVD, top width 22’, length 15580’

2) (C-S-02) CLBSA delivery canal to CLBSA WRA, bottom width 50’, side slopes 1V on 3H, bottom elevation -1.0 ft-NGVD, average ground 5.0 ft-NGVD, top width 86’, length 4433’
3) (C-BB-02) Dade-Broward Levee conveyance canal from C-6 to C-4, bottom width 110’, side slopes 1V on 1H, bottom elevation -9.0 ft-NGVD, average ground 5.0 ft-NGVD, top width 138’, length 65784’
4) (C-EEE-02) Conveyance canal from CLBSA WRA to L-30 canal, bottom width 50’, side slopes 1V on 3H, bottom elevation -2.0 ft-NGVD, average ground 5.0 ft-NGVD, top width 92’, length 4054’

Policy Issues, Seepage Issues and/or Questions:

Component: WCA 3A/3B Levee Seepage Management
Component: O List: A

Alternative 2 Modifications to Alternative 1:
No change from Alternative 1

Alternative Summary & Component Description/Modifications:

- Area calculations:
  Total WCA-3A/3B Area: 4565 acres
  WCA-3A Seepage Management Area: 1780 acres
  WCA-3B Seepage Management Area: 2785 acres

Levees:
1) (L-O-01) US-27 conveyance canal levee from C-11 north to US-27/I-75 Interchange, top width 12’, side slopes 1V on 3H, height 8’, average ground 8.0 ft-NGVD, bottom width 60’, perimeter length 31485’
2) (L-O-02) US-27 conveyance canal levee from C-11 south to US-27/Krome Avenue intersection, top width 12’, side slopes 1V on 3H, height 8’, average ground 6.0 ft-NGVD, bottom width 60’, perimeter length 44720’
3) (L-Q-02) Mobile home perimeter protection levee, top width 12’, side slopes 1V on 3H, height 5’, average ground 6.0 ft-NGVD, bottom width 42’, length 7620’

Policy Issues, Seepage Issues and/or Questions:

Component: NNR Diversion
Component: List: A

Alternative 2 Modifications to Alternative 1:
No change from Alternative 1

Component: Eastern C-4 Divide Structure
Component: T List: A

Alternative 2 Modifications to Alternative 1:
No change from Alternative 1

Component: Bird Drive Recharge Area
Component: U List: A

Alternative 2 Modifications to Alternative 1:

a) Create a 2000 foot wide Water Redistribution Area (WRA) on the northern portion of the impoundment footprint. Inflows are made at the eastern end and flow to the west before entering the main recharge area.
b) West Dade Wastewater Treatment Plant (WDWTP) flows are changed.

Design Rational:

a) Impacts from stormwater runoff backpumped from C-4 are contained to a limited area.

Operational Scenarios & Rules:

Alternative Summary & Component Description/Modifications:

- Area calculations:
  Impoundment Area: 2886 acres

Structures:

1) (P-U-01) 800 cfs pump station for SDCS deliveries when required from C-4 to relocated L-31N
2) (P-U-02) 200 cfs pump station for inflow from C-4 to impoundment, ON 4.5 ft-NGVD, OFF 4.0 ft-NGVD
3) (P-U-03) 150 cfs seepage collection pump station for the eastern boundary, ON 5.8 ft-NGVD, OFF 5.3 ft-NGVD
4) (P-U-04) 150 cfs seepage collection pump station for the southern boundary, ON 5.8 ft-NGVD, OFF 5.3 ft-NGVD
5) (S-U-01) 100 cfs gated culvert discharging from the impoundment into the SDCS
6) (S-U-02) 2-150 cfs gated culverts on C-1W to replace S-338 that is removed.

Levees:

1) (L-U-01) Impoundment levee on all boundaries, top width 12′, side slopes 1V on 3H, height 7′ = 4′ depth + 3′ superiority, average ground 5.2′, bottom width 54′, length 44950′
2) (L-U-02) Impoundment internal levee, top width 12′, side slopes 1V on 3H, height 7′ = 4′ depth + 3′ superiority, average ground 5.2′, bottom width 54′, length 7652′

Canals:

1) (C-U-01) Conveyance and seepage collection canal from C-4 to L-31N-E, bottom width 90’, side slopes 1V on 1H, bottom elevation -4.0 ft-NGVD, average ground 5.2 ft-NGVD, top width 108’, length 22595’
2) (C-U-02) Conveyance canal from impoundment to C-1W, bottom width 90’, side slopes 1V on 1H, bottom elevation -4.0 ft-NGVD, average ground 5.2 ft-NGVD, top width 108’, length 24785’

a) Policy Issues, Seepage Issues and/or Questions: